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ABSTRACT

A study was conducted in which word processing and voice synthesis were used to teach beginning writing skills to kindergarten and first grade students. Subjects, 46 children from two elementary schools enrolled in an early education summer school class in writing, were randomly divided into three groups. One group was taught writing using a beginning-level word processor and printer. The second group used a word processor capable of synthesized speech and a printer. The final group did not use word processing equipment but had access to a copying machine and were allowed to make transparencies of their stories for sharing. The children in the two word processing groups were given three sessions of keyboard training before they started writing (the voice synthesizer group was taught the "talk" command). Students were asked to write six stories in the two-week period and were encouraged to form collaborative and editing groups. Each child was assigned two "writing helpers" and had to have each story approved by them before turning it in. Results indicated that very young children can benefit from instruction using word processors and voice synthesizers and that using these devices seemed to foster collaborative writing. The use of word processing cannot substitute for quality writing instruction, but a combination of the two can facilitate group discussion and peer editing. (Twenty-seven references are included.) (AEW)

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A COMPARISON OF WRITING INSTRUCTION USING WORD PROCESSING, WORD PROCESSINGWITH VOICE SYNTHESIS, AND NO WORD PROCESSING IN KINDERGARTEN AND FIRST GRADE

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Research on computer word processing in schools is limited, but it does provide some evidence that it is beneficial for writing instruction. A number of writers and researchers have reported that word processing can be useful in helping students write more readily and skillfully (Bean, 1983: Coburn; Kelman, Roberts, Synder, Watt, and Neiner, 1982; Daiute, 1982, 1983; Hennings, 1981, 1983; Monahan, 1982; Moran, 1983; Piper, 1983; Schwartz, 1984; Whithey, 1983). These authors have cited the computer's value in aiding students' writing efforts by facilitating letter formations, reducing the frustrations of recopying, by facilitating the reading of text during the various stages of the writing process, by producing neat, publishable copies from the computer's printer, and by making possible the reproduction of drafts of compositions for easy sharing with teachers and peers as the writing process unfolds. Kane (1983) found that students composed more text using a word processor than with paper and pencil. Daiute (1983) conducted a year-long study with junior high students working with a word processor that provided prompts and suggestions for revision based on limited textual analysis. Daiute found that both the word processor and other revision prompts led to more frequent and varied revisions. Both Kane and Daiute reported some difficulties with typing and learning the word processing commands. Kurth and Stromberg (1984) and Kurth (1987) reported that students using word processing felt that they had written longer compositions and could write more successfully, even when there was no significant difference between the length of compositions of students using word processors and those not using word processors.

Most of the word processing research has focused on composition and revision strategies at the college, high school or upper elementary grades or in classes for

learning disabled students. Little research has been done using word processing with children in kindergarten, first and second grades. The use of computers in early childhood education is fairly widespread. However, the main use of computers in early grades has been to teach early reading skills (alphabet names, phoneme-grapheme relationships, etc.) or beginning programming skills using Logo. Little research has been done using word processing to teach writing in these early grades. A few studies have found that the computer as a writing tool mainly facilitates the development of writing skills for children not yet capable of printing fluently by hand. (Collins 1984: Kleiman & Humphrey, 1982: Borgh and Dickson, 1986). Neuman and Morocco (1986) found that word processing encouraged a collaborative writing environmewnt when it was fostered by teachers who understood the communicative purposes of writing.

Neuman & Morocco also studied the effect of the malleability of the word processing text and its effect on student writing. In some instances they found that the computer became more than a writing tool; in fact, word processing helped some students learn to manipulate and play with language easily. They also found that the computer was helpful in working through writer's block in some instances.

Recent advances in technology have made it possible to add spoken feedback to word processors which may further facilitate the writing process. Borgh and Dickson (1986) found that voice synthesis improved children's writing ability. However, little research is available which has explored the possibilities of word processing with voice synthesis for writing instruction.

The major purpose of this paper is to report a study in which word processing and voice synthesis were used to teach beginning writing skills to kindergarten and first grade students.

PROCEDURES

The Subjects were 46 kindergarten and first grade students from two elementary schools who were enrolled in an early education summer school class in writing. These were not students who were failing and had to go to summer school. Rather, these students had parents who expressed an interest in extra instruction in writing. Each of these students attended the special writing class for one hour four times a week during a three week summer school session of three hours per day. The other two hour sessions were spent in music, art, and story activities.

These students were randomly divided into two groups of 15 children and one group of 16 children. One group of kindergarten and first grade children was taught writing using a beginning word processor and printer. A second group of children was taught writing using a word processor which utilized synthesized speech and a printer. The third group of students was taught writing skills using no word processing equipment. However, they had access to a copying machine in order to share their stories. They also were allowed to make transparencies of their stories for sharing.

The equipment used for the two word processing groups included 10 IBM Junior computers equipped with voice synthesizers. The Word Processing Program used in the word processing group was Word Perfect Junior (1984). The word processing program used in the word processing plus voice synthesis group was a modified version of the Talking Screen Text Writer by Rosegrant and Cooper (1983). This program was modified so that many close spellings and many non phonetic spellings of words were already in the program. This modification eliminated, except in a few instances, the need to use the "fix speech" command which embeds the phonetic pronunciation of the word into the synthesizer program.

Before the actual writing classes were begun, the children in the two word processing groups received three sessions of keyboarding training. The children in the non word processing group were allowed to use computers to play games and to use the computers for math drill and practice sessions during this time. Although two different word processors were used, the children in each of the word processing groups were taught the same four basic word processing commands. After the keyboarding sessions, students were simply encouraged to type a story. When they made a mistake, instructors showed them how to delete letters and words. When they finished a story they were taught a save command and a file name command. Thus all children using word processors were taught the correct keyboard finger positions, a name file command, a save file command, a delete, and a backspace command. They were also shown how to use the left and right arrows.

In addition, the children in the voice synthesizer group were taught the "talk" command. They could listen to their story at any time as they were writing it. However, they were not taught the command to have the voice synthesizer read the material aloud as they were typing. A pilot study had shown that this appeared to confuse the kindergarten children. As soon as they had typed a word, they could ask the synthesizer to read the word for them. In the few instances in which the synthesizer did not read the word correctly, the instructors modified the embedded spelling so the synthesizer pronounced the word accurately.

All three groups were team taught by two graduate students in reading who were certified teachers and who had special training and interest in beginning writing instruction. The same pre writing discussions, writing instruction and revision instruction were used in all three instructional groups.

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The curriculum in all three classes emphasized composition strategies which were especially designed for young children. These sessions included pre writing, writing, and revision instruction. Purposes for writing and audiences for writing were also discussed in all classes, and collaborative writing and editing groups were encouraged in all three classes.

The writing assignments were the same for all three groups. The only difference between the work done by the three groups was that in the word processing group the children were instructed to write their stories on the word processor rather than on manuscript paper. The children in the word processing with voice synthesis group were told to write their stories using the word processor, and when they had finished they were told to listen to the synthesizer read the draft of the composition.

Children in the word processing group and in the word processing with voice synthesis group were allowed to use a program to draw a picture to illustrate their story using the computer graphics. The children in the non word processing group were encouraged to draw a picture to illustrate their story. The non word processing group was allowed to thermofax their completed stories and pictures on a transparency for use with an overhead projector.

Every student was asked to write six stories in the two week period. Students were also encouraged to form collaborative and editing groups. Each student in each group was assigned two partners (called "writing helpers"). Before a student could consider the assignment finished, his/her story had to have been approved by the "writing helpers."

Children were also taught the terms writing and editing. They were taught that "writing" was finished when their story said what they wanted it to say. Editing was considered complete when the story could be read by others in their group.

Invented spelling was accepted as a legitimate way in which to write words. However, if a person in their "writing helper" group could not read the invented spelling, the children were instructed to ask the helpers or the teacher for the standard spelling. The major focus of the instruction, however, was on writing rather than on editing.

RESULTS AND DISCUSSION

Copies of all of the stories which the children considered complete were collected for the analysis of variance. The number of words in the final draft for each composition was determined. The mean and standard deviation for composition length for each group were determined.

Each composition was also rated holistically on a five point scale by three graduate students who were trained in holistic scoring of compositions written by young children and who had participated in the state wide scoring of the basic skills writing test.

Before the compositions were scored, the compositions from all three groups were retyped with punctuation and spelling exactly as written by the children. This was done so that the scorers could not tell which compositions had been written by which group.

The compositions were also analyzed for correct mechanics; i.e.; punctuation, capitalization, and spelling. However, because the writers were so very young, these factors were not considered in the holistic analysis of quality.

Analysis of Composition Length

When the compositions were analyzed for length, the average composition length for children in the non word processing group was 32 words (s.d. = 8.6). The

average composition length for children in the word processing group was 45 (s.d. = 10.8) words and the average composition length for children in the word processing with voice synthesis group was 31 words (s.d. = 7.1 words).

The children using paper and pencil wrote significantly shorter compositions than did the students in either of the word processing groups. The children in the word processing with voice synthesis group wrote significantly shorter compositions than did the children who used word processing without voice synthesis. This composition length finding differs from the finding in our previous research with older children (fifth through tenth grade) (Kurth 1987) where there was no significant difference in composition length between groups using word processors and those not using word processors. Because manuscript printing is difficult and tedious for young children, the use of the word processor may have enabled them to write longer compositions with less strain.

The children using the word processing with voice synthesis wrote compositions which were significantly shorter than those students who used only the word processors. This might have occurred because the children in the synthesizer group spent considerable time listening to their compositions being read by the synthesizer. Because they repeatedly listened to their compositions, they had less time to write than the non voice synthesizers groups.

Analysis of Composition Quality

Holistic ratings of compositions by three independent scorers showed no significant difference in quality between each of the three groups. The mean holistic quality score for the word processing group was 4.1 (s.d. = .5); the mean holistic quality score for the word processing with voice synthesis group was 3.9 (s.d. = .5); and the mean holistic quality score for the non word processing group was 3.8 (s.d. =.7).

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Although composition length was significantly different among the three groups, the composition quality was not significantly different. The quality of the compositions was generally judged as very high; the mean quality score for all compositions was 3.85. Careful instruction in pre writing and composing skills did help these children learn to write quality paragraphs for their developmental level.

When the compositions were analyzed for punctuation and spelling, there was a significant difference in the number of invented spellings used in the final drafts of each of the three groups. The mean number of invented spellings per composition was 3.4 (s.d. =.6) in the non word processing group; 2.7 (s.d. = .3) in the word processing group; and 1.6 (s.d. =.3) in the word processing with voice synthesis group. Thus, the children who used word processors with word synthesis used fewer invented spellings in their final drafts of compositions than students in either of the other two groups. The children in the word processing with voice synthesis used the least number of invented spellings in their compositions. This may have occurred because the word processor with voice synthesis could not read the word correctly if the spelling was not close to the phonetic pronunciation or to the preprogrammed spelling. If the computer could not synthesize the word correctly, the child may have been more likely to change the invented spelling to the standard spelling.

Even though the word processing with synthesizer group wrote significantly shorter compositions than the word processing alone group, the teachers felt that the use of the voice synthesizer added an important dimension to the writing instruction. They felt that the feedback the children received from hearing their stories helped them maintain a greater sense of audience. They also felt that valuable reading skills were being fostered as the students read the compositions with the synthesizer.

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Although the use of collaborative writing was encouraged in all three groups, the instructors' notes suggested that collaboration occurred most often and most easily in the word processing with voice synthesis group. The instructors reported that often when the synthesizer began to read the draft, the children in the editing group and others would gather around and read the story aloud with the synthesizer. With some encouragement from the instructors, the children often discussed the content and the language of the composition.

Instructors also reported that this same collaborative activity occurred when children read other children's compositions which appeared on the computer screens in the word processing group, but it did not occur as often as in the group using the voice synthesizer. Collaborative writing occurred even less in the non word processing group. Since "writing helpers" were encouraged, the instructors found that the use of transparency copies and dry copies helped build collaboration in the non word processing group. However, instructors reported that often the illegibility of a child's handwriting made it difficult for the other children to read the composition even though copies were made available. This drawback seemed to discourage collaborative writing in the non word processing group. Thus, the attraction of the computer screen, the novelty of the voice synthesizer, and the legibility of printed copies all seem to foster collaboration when writing with word processors.

SUMMARY

The results of this study show that very young children can benefit from careful instruction in composition writing with or without word processing and voice synthesis. However, the results also show that it is possible for very young children to master the rudiments of word processing with little special training. After mastery, the

word processor appears to free them from the difficulty of manuscript writing and results in longer compositions. The use of word processing programs and voice synthesizers also seems to foster collaborative writing.

The children in the word processing groups did learn correct keyboarding techniques in a relatively short period of time. Even though they were young, these students mastered simple word processing techniques such as "delete," "save," and "retrieve." The improvements in word processing programs for children and the fact that only very simple commands were used may have accounted for the differences between this and other studies in the ease of learning the word processing. Even very young children could learn the word processing programs and still produce compositions of high quality.

Therefore, word processing, and word processing with voice synthesis combined with effective instruction in writing, does appear to be a tool of promise for even very young children as they begin to write. Many of the tedious tasks of writing and revision can be done mechanically so students are free to concentrate more fully on the quality of the message.

However, it needs to be emphasized that only a combination of high quality reading instruction along with word processing can result in improved writing. This study does not support the idea that working with word processing will automatically increase the quantity and quality of student compositions. The use of word processing can only enhance the teaching of written composition. The most important ingredient in any composition program is a teacher who is knowledgeable about the composing processes. Instruction in pre writing activities, organizational methods, draft writing, revision skills, and provision for publishing student work are necessary parts of any composition instruction with or without word processing. The use of word processing cannot

substitute for quality instruction in the entire writing process. However, the use of computer word processing in writing programs seems to have motivational value, seems to facilitate group discussions about writing, and may help foster peer editing.

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